

## **Low cost evaluation board/programmer for 908Qx series microcontrollers**

### ***Abstract***

The little board may serve several purposes as:

- teaser/evaluation board with the capability to build a prototype of a small device using 908Q series MCU
- programmer for 908Q chips
- monitor connection board using two-wire (one signal plus ground) connection to the target system and RS232C connection to PC

Compared to the hardware currently available from Motorola it has several added features:

- ability to serve as a low-cost programmer for fresh (or badly programmed) chips
- ability to operate the MCU from 5V or 3V supply voltage
- ability to force the chip placed in the board into any of three vendor-provided monitor modes (Vtst using ext. oscillator and two forced modes using ext. and int. oscillator)
- new, improved user monitor firmware
- ability to connect to the target system using the two-wire monitor interface.

### ***Project description***

#### **Hardware**

The goal was to design a circuit that would be nearly as cheap as Motorola Nitron Demo Board while extending its capabilities to maximum. Considering the added elements, the resulting circuit differs from the Demo Board in three aspects:

- 10-position DIP switch is used to configure the board,
- there are 3 pushbutton switches available,
- a socket for ready-made oscillator or an oscillator using quartz and 74HCU04 is provided.

#### **Firmware**

An improved version of UserMonitor was developed for the board. The original goal was to reduce the footprint of UserMonitor while preserving the functionality of firmware present in chips used on the Nitron demo board. The new UserMonitor routine fits in the last 64 bytes of Flash, freeing the area between \$FFB0 and \$FFBD.

As soon as I started working with the 908QY4 chips I received, I noticed that the OSCTRIM value is left at \$FF, contrary to what was written in the docs. Programming the OSCTRIM with this value, as it is done with the original UserMonitor would render the chips unuseable in User Monitor mode. The minor modification was done to UserMonitor, allowing it to skip the OSCTRIM programming if the value to be programmed is \$FF. The required version of UserMonitor firmware may be chosen before compilation by setting the variable `correct_trim` as described in the source file.



